HOOD AND DUCT DESIGN INTENT
VENTILATION CONTROL AND FIRE PROTECTION OF
COMMERCIAL COOKING OPERATIONS
2001 NFPA 96 and 1997 SMC Chapter 5
(To Accompany Architectural Review)

Circled items require revision/clarification by contractual documentation (i.e., revised drawings, specifications, addenda, etc.) before plans can be approved. Answers in letterform are not acceptable. **Starting construction before plans approval may be considered as just cause, by the State, to issue a stop work order. [Rule 0780-2-3-.02]**

I. Submittal Requirements

1. Provide two sets of sealed design drawings for the commercial kitchen hood and duct system with preliminary static pressure loss calculations and room ventilation balancing.

2. Provide a floor plan sealed by a Tennessee registered architect or engineer showing the kitchen layout, location and type of cooking equipment, duct system, fans, fuel sources (gas or electric), fire suppression system, means of egress, suppression system pull location, prep tables, cabinets, electrical control panels, and extra hazard fire extinguisher location. [Rule 0780-2-3-.03 and A&E Rule 0120-2-.03(3)]

II. Commercial Hood

1. Cooking equipment used in processes producing smoke or grease-laden vapors shall be equipped with an exhaust system (hood, grease removal devices, a duct system, and fire extinguishing equipment). [NFPA 96 4.1.1 and SMC 504.1]

2. These standards shall apply to residential cooking equipment used for commercial cooking unless the requirements of NFPA 96 1.1.4 are met. [NFPA 96 1.1.2]

3. Show new and existing cooking equipment layout providing equipment name plate data. Identify energy requirements, electric circuit number, electric shunt trip, and gas solenoid shut off valve. [NFPA 96 10.4]

4. All deep fat fryers must be installed with a 16 inch space between the fryer and surface flames from adjacent cooking equipment. Where a steel or tempered glass baffle plate is installed at a minimum of 8 inches in height between the fryer and surface flames of the adjacent appliance, the requirement for a 16 inch space shall not apply. [NFPA 96 12.1.2.4 and 12.1.2.5]

5. Identify fuel source (gas or electric) for all equipment whether new, existing, or not in contract and provide name plate data. [NFPA 96 10.4 and Office Policy]

6. Provide mechanical gas shut off valve details. [NFPA 96 10.4.1 and 10.4.3]

7. The hood must be listed by a nationally recognized testing laboratory (U.L., ETL, etc.). The hood system must be installed as it is listed. Provide the following listing information: on-line U.L. listing card/file and identify specific criteria for the system: model number, hood length and width, minimum exhaust CFM, maximum supply CFM, and maximum cooking surface temperature. [Office Policy and terms of third party listing]

8. Provide a schedule for the hood and fans to include the hood manufacturer and model number, exhaust and supply CFM, hood collar and ductwork static pressure losses, fan manufacturers, and fan static pressures.

9. Provide a kitchen area supply and exhaust air balancing schedule verifying that the total outdoor air supplied equals the volume removed or of such quantity that the negative pressure created does not exceed 0.02 inches of water column. [NFPA 96 8.3]

10. Show a scaled full height cross-section of the hood and duct system. The distance between the grease removal device and the cooking surface must be a minimum of 18 inches and a minimum of 4 feet from char-broilers. Show mounting height above finish floor, offsets between hood and wall based on listing requirements or manufacturer installation instructions, and show method of support. [NFPA 96 6.2.1]

11. The return air intake for re-circulating air conditioning systems must not be closer than 10 feet from the cooking appliances. [SMC 409]

12. A fire damper actuated at a maximum of 286^{o}F must be installed in the supply plenum. [NFPA 96 5.3.4]

13. A damper must not be installed in the exhaust system. [NFPA 96 9.1.1 and SMC 505.11]

14. Upblast exhaust fans must be hinged, supplied with flexible weatherproof electrical cable, and service hold-open retainers. [NFPA 96 8.1.1] For in-line or utility set exhaust fans see NFPA 96 8.1.2 and 8.1.3.

15. See NFPA 96 Chapter 13 for recirculating systems.

16. See NFPA 96 Chapter 14 for solid fuel cooking operations.

17. A portable alkaline extinguisher listed for extra hazard class fires must be ten to twenty feet from cooking equipment and five feet above the floor. [NFPA 96 10.10 and SMC 507.2] NOTE: Class B gas-type portables such as CO_2 and halon shall not be used in the kitchen cooking area. [NFPA 96 10.10.3]

18. Provide a wiring and control diagram showing the exhaust and supply fan and interface with the fire suppression system, building alarm, electrical shunt trips, gas valves, etc. Provide terminal numbers, wiring numbers, and panel numbers. Provide a sequence of operation or logic. [Rule 0780-2-3-.03 and Office Policy to establish design completeness]

    A. Show how the fire protection system must activate the building general and supervisory alarms. [NFPA 96 10.6 and 10.7] Identify fire alarm I/O point and module number.
    B. Show provisions for how the exhaust fan continues to operate after the extinguishing system has been activated. [NFPA 96 8.2.3.1]
    C. Show provisions for how the supply fan is shut off when the extinguishing system is activated. [NFPA 96 8.3.2]
    D. Provide hood manufacturer control panel terminal layout and connection information.

19. Show panel designation and shunt trip circuit number. [NFPA 96 10.4]

20. Show electrical gas emergency stop solenoid valve details. [NFPA 96 10.4]

III. Fire Suppression System

1. A fire suppression extinguishing system is required for protection of grease removal devices, hood exhaust plenums, and exhaust duct systems. [SMC 507.1 and NFPA 96 10.1]

2. Show a large scale plan view of commercial hood with scaled cooking equipment in position beneath hood. Show suppression system piping and special listed sprinkler head or fixed system nozzle on the kitchen layout plan. [NFPA 96 10.1 and Office Policy to ensure equipment coverage]

3. Hood extinguishing system must comply with the U.L. 300 performance test by one of the following means.

   A. Carbon-dioxide system [NFPA 12]
   B. Sprinkler system [NFPA 13]
   C. Fixed baffle hood with water wash. [NFPA 96 10.2.7]
   D. Dry chemical system [NFPA 17]
   E. Wet chemical system [NFPA 17A]

4. Provide U.L. listing card for special listed atomizing sprinkler head for deep fat fryers and cooking equipment, plenums, exhaust collars, etc. [NFPA 13 7.9.8.2, NFPA 13 7.9.6.1, Office Policy and terms of third party listing]

5. Show the location of the manual pull station for activating the fire extinguishing system. It must be located along the means of egress [NFPA 96 10.5.1]

6. Show complete isometric piping diagram including pipe size, segment length, drop lengths, fixed system suppression nozzle and orifice size or specially listed sprinkler head. Include nozzle or head for exhaust plenum and duct system. [Rule 0780-2-3-.03 and Office Policy to ensure design completeness]

7. Provide a scaled elevation view of any tilting brazing pan in both positions with cover up or down along with the extinguishing system drop and nozzle or special sprinkler head to demonstrate that the equipment function does not interfere with the suppression system coverage. [NFPA 96 10.1 and Office Policy to ensure noninterference of covered equipment]

8. Hood exhaust plenum chambers must have one sprinkler or automatic spray nozzle centered in each chamber for each 10 ft in length or portion thereof. Sprinkler heads or automatic spray nozzles must be evenly spaced and not more than 10 feet apart. [NFPA 13 7.9.5.2 and 7.9.5.1]

9. Each hood exhaust duct collar shall have one sprinkler or automatic spray nozzle located 1 in. minimum to 12 in. maximum above the point of duct collar connection in the hood plenum. [NFPA 13 7.9.4.1]

10. Unless the entire exhaust duct is connected to a listed exhaust hood incorporating a specific duct collar and sprinkler (or automatic spray nozzle) meeting UL 300, exhaust ducts shall have one sprinkler or automatic spray nozzle located at the top of each vertical riser and at the midpoint of each offset. [NFPA 13 7.9.3.1]
11. Unless the entire exhaust duct is connected to a listed exhaust hood incorporating a specific duct collar and sprinkler (or automatic spray nozzle) meeting UL 300, horizontal exhaust ducts shall have sprinklers or automatic spray nozzle devices located on 10 ft centers beginning no more than 5 feet from the duct entrance. [NFPA 13 7.9.3.3]

IV. Exhaust Duct System

1. Provide a table of losses for the elements of the exhaust duct system (collar, straight segments, change of direction, extinguishing system nozzles or sprinkler heads, and other appurtenances). [Office Policy to establish duct system static design pressure]

2. The exhaust fan must be listed for by a nationally recognized testing laboratory (U.L., etc.). The fan system must be installed in accordance with the terms of listing. Provide the following listing information: on-line U.L. listing card/file and identify specific model number. [Office Policy and terms of third party listing (greasy atmosphere, etc)]

3. Provide exhaust fan performance curves (volume, static pressure, and horse power) and indicate design point on selected curve. [Office Policy to establish air volume at design point and terms of listing]

   A. The design point must be over the minimum limits specified on the third party listing card to comply with the testing laboratory's application requirements to ensure performance.

4. Make up air system: Provide supply fan performance curves (volume, static pressure, and horse power) and indicate design point on selected curve if the selected hood is a supply and exhaust hood system. Include a copy [Office Policy to demonstrate compliance with the testing lab's application requirements to ensure performance]

   A. The make up air unit must be listed for by a nationally recognized testing laboratory (U.L., etc.).
   B. The supply air system must be installed in accordance with the terms of listing.
   C. Provide a table of losses for the supply fan (collar, straight segments, change of direction, and other appurtenances).
   D. The design point must be under the maximum limits specified on the third party listing card.

5. Exhaust ducts must be designed and sized to provide a minimum air velocity of 500 feet per minute. [NFPA 96 8.2.1.1 and Office Policy] Identify largest cross-section area of the duct system and provide calculations demonstrating how it meets 500 fpm.

6. The exhaust ducts can not pass through fire rated partitions (without shaft protection) and must be independent of any other building ventilation or exhaust system. [NFPA 96 7.1 and SMC 505.8]

7. Access panel openings must be provided at the sides or at the top of the duct, whichever is more accessible, and at changes of direction. [NFPA 96 7.3.1 and SMC 505.5.1]

8. Access panel openings must be protected by approved access constructed and installed in accordance with the requirements of NFPA 96 7.4.4. [NFPA 96 7.3.2]

9. Sprinkler and Automatic Spray Nozzle. Access shall be provided to all sprinklers or automatic spray nozzles for examination and replacement. [NFPA 13 7.9.7]

10. A sign must be placed on all access panels stating the following: ACCESS PANEL — DO NOT OBSTRUCT. [NFPA 96 7.1.6 and SMC 505.5.2]

11. All sections of the exhaust duct system must be constructed and installed without forming dips and traps and must slope not less than one inch per foot toward either the hood or an approved residual trap. [SMC 505.4]

12. The exhaust duct must lead as directly as is practical to the exterior to decrease the fire hazard and must comply with the following: [NFPA 96 7.1.2.]

    A. Ducts must be constructed of and supported by 16-gauge carbon steel or 18 gauge stainless steel. [SMC 505.1 and NFPA 96 7.5]
    B. All seams, joints, and penetrations must have liquid tight external welds. [SMC 505.2 and NFPA 96 7.5.2.1]
    C. An access panel must be provided for hoods with dampers on exhaust or supply collars and for all openings required for accessibility. [NFPA 96 7.1.5 and SMC 505.4]

13. Fire rated shaft protection is required for interior installation of duct systems. [NFPA 96 7.7 and 1999 SBC 705.2.2]

    A. One-hour rated shaft enclosure for ducts connecting three stories and less. [NFPA 96 7.7.2.1.1 and SMC 505.9]
    B. Two-hour rated shaft enclosure for ducts connecting four stories or more. [NFPA 96 7.7.2.1.2 and SMC 505.9]
    C. Ducts that pass through a rated roof/ceiling assembly must be enclosed by a shaft. [NFPA 96 7.7.1.2]

14. Provide a scaled detail showing the necessary clearances for the exhaust duct system.

    A. Where required to be enclosed, the minimum clearance must be maintained between the ducts and the interior surface of the enclosure. [NFPA 96 7.7.2.2, Section 4.2]
    B. For clearance reductions see NFPA 96 4.2.3, for other clearance recommendations see NFPA 96 4.2.4, 4.3, 4.4, and 4.5.

15. Where fire rated shaft enclosures are not required, hoods, grease removal devices, exhaust fans, and ducts must have clearances as follows. [NFPA 96 4.2.1, Figure A 4.2 (d), and SMC 504.4]

    A. Minimum 18 inches to combustible materials. [NFPA 96 4.2.1]
    B. Minimum three inches to limited combustible materials and zero inches to noncombustible materials
    C. Where the hood, duct, or grease removal device is listed for clearances less than those required by NFPA 96 4.2.1, the listed requirements shall be permitted. [NFPA 96 4.2.2]

16. Exterior installation of exhaust ducts must be vertical wherever possible, be located at least 18” from combustibles, 3” from limited combustibles, and must be painted or provided with some other means of weather protective coating (except stainless steel ducts). [NFPA 96 7.6]

17. For roof termination, exhaust outlets must be located 10 feet from adjacent buildings or intake openings, [NFPA 96 7.8.2(1)] and located a minimum of 5 feet from the outlet (fan housing) to any combustible structure. [NFPA 7.8.2.1(2)]

18. Where the exhaust fan terminates at a wall, it must meet the following.

    A. A clearance of ten feet from the outlet to adjacent buildings, property lines, grade level, electrical equipment, or to any intake or operable door or window at or below the plane of exhaust termination. [NFPA 96 7.8]
    B. The closest point of any air intake or operable door/window above the plane of exhaust termination must be minimum ten feet distance plus three inches for each one-degree from horizontal. [NFPA 96 7.8.3(2)]
    C. All ductwork must be pitched to drain the grease back into hoods, or to container within the building, or into a remote grease trap. [NFPA 96 7.8.3(5)]